STAFF SUMMARY SHEET

	TO	ACTION	SIGNATURE (Surname), GRADE AND DATE		TO	ACTION	SIGNATURE (Surname), GRADE AND DATE
1	DFPY	sig	(sig) Cook, O-6, 2 Apr 12 (print)	6			
2	DFER	approve	CIV JAPR	7			
3	DFPY	action		8			
4				9			
5				10			

SURNAME OF ACTION OFFICER AND GRADE	SYMBOL	PHONE	TYPIST'S INITIALS	SUSPENSE DATE
Dr. Leonard Kahn, AD-23	DFPY	333-8639	LK	Not Applicable

SUBJECT	DATE
Clearance for Material for Public Release USAFA-DF-PA-~~2016~~ 224	

SUMMARY

1. PURPOSE. To provide security and policy review on the document at Tab 1 prior to release to the public.

2. BACKGROUND.
Authors: Leonard Kahn (sole author) Associate Professor of Philosophy, U.S. Air Force Academy
Title: "Voluntary Human Engineering, Global Climate Change, and N-Person Prisoners Dilemmas"

Description: I argue that replying on human engineering as a response to global climate change will be both unjust or inefficacious (or both) as long as it is voluntary because of the possibility of n-person prisoners dilemmas.

Release Information:

Recommended Distribution Statement:
(Distribution A, Approved for public release, distribution unlimited.)

3. DISCUSSION.

4. VIEWS OF OTHERS.

5. RECOMMENDATION.

Leonard Kahn, AD-233
Associate Professor

Voluntary Human Engineering, Global Climate Change, and N-Person Prisoners Dilemmas

I agree with Laio *et al.* that anthropogenic global climate change (AGCC) is an urgent problem, and I am inclined to agree with the authors that we should take seriously the possibility of human engineering (HE) as a response to this problem. But I have reservations, two of which I discuss here. While I think the concept of HE needs much more careful analysis before we come to any general conclusions about it, my main worry is this: Liao *et al.* do not sufficiently appreciate how difficult it would be to use HE, even on a relaxed understanding of the term, in a manner that is simultaneously (i) voluntary, (ii) just, and (iii) efficacious in dealing with AGCC.

Let me begin with the very idea of HE. Though the authors tell us that HE is, or at least involves, "biomedical modifications" (2012, pg. 4) of human beings, this is an unruly concept which cries out for careful analysis. A complete analysis is, of course, a project for another time and place, but let me offer an example of the sort of thing I have in mind and why it matters.

A good conceptual analysis would distinguish among at least three kinds of HE: Permanent, Stable, and Unstable. Permanent HE changes irrevocably those who are engineered. One example of Permanent HE which Liao *et al.* discuss is making (future) humans smaller, through manipulation at the genetic level or through control of a hormone such as somatropin. In contrast to Permanent HE, Stable and Unstable HE can be reversed. The main difference between Stable HE and Unstable HE is that instances of Stable HE will persist unless we do something to change them, but instances of Unstable HE will not. A prosthetic limb is a good example of Stable HE, while a drug such a modafinal, which temporarily enhances memory, is a good example of Unstable HE.

Why should we care about this distinction when it comes to AGCC? First, different kinds of HE raise different kinds of ethical questions. For instance, the benefits and burdens of Unstable HE could be shared without devoting enough social resources to make sure everyone has these benefits and burdens all of the time. But this is untrue of Permanent HE and probably of Stable HE as well. Second, Permanent HE is more ethically problematic than either Stable or Unstable HE. Permanent HE is, after all, *permanent*. Those who receive its benefits and/or burdens cannot opt-out later, while those who receive the benefits and burdens of Stable or Unstable HE can. If we are to take seriously the idea of HE, as the authors argue, we must keep these points in mind. To repeat, a full analysis of the concept will have to wait. What I have said here is only the first move in a long game of chess, but I hope it makes the nature of this game fairly clear.

Yet even if we set these conceptual issues aside, there are reasons to be skeptical about using HE as a response to AGCC. Laio *et al.* correctly point out that "[m]any environmental problems are the result of collective action problems, according to which

Each player has a choice of two moves: cooperate or defect. Let p = the price that a player must pay if and only if she chooses to cooperate. Finally, let x = the benefit that each player receives, regardless of whether or not she cooperates, provided that a minimum number of players, m, in fact do cooperate, where m is close to – but less than – n. The difficulty is clear. Each player is better off defecting than cooperating, regardless of whether or not m or more players cooperate. But, if each defects, all players are worse off than they would have been if all (or nearly all) had cooperated.

	m or more players cooperate	**less than m players cooperate**
cooperate	x - p	p
defect	x	0

How might we use HE as a response to a collective action problem like the one just described? Consider an example which the authors themselves suggest: the pharmacological enhancement of altruism. One way to implement such a strategy would be to increase our levels of a peptide such as oxytocine, which can be given, e.g., as a nasal spray. Patricia Churchland reports a number of cases in which increased levels of oxytocine appear to promote trust and empathy (2011: 71-81). Plausibly, a greater degree of trust and empathy would make cooperation more likely in game like the one discussed above. So far, so good.

The problem is that Laio *et al.* tell us "as we envisage it, human engineering would be a *voluntary* activity...rather than a coerced, mandatory activity" (2012: 5, italics in the original). Now, assume that voluntary HE is wide-spread enough for the common good to be available (i.e., the number of players who cooperate is greater than or equal to m). The result will be *prima facie* unjust, since those who voluntarily undergo HE will bear the cost of providing the good while those who do not will not. Worse, assume that voluntary HE is not wide-spread enough for the common good to be available. The outcome is precisely what we would expect without HE, despite expending valuable resources on it. Under the first assumption, we have injustice, and under the second we have lack of efficacy in bringing about common goods such as adapting to, stopping, or even reversing AGCC. The only way to avoid both of these scenarios is to make HE mandatory. And that, for better or worse, is exactly what the authors reject.

References

Anderson, 2012. "How Engineering the Human Body Could Combat Climate Change." <http://www.theatlantic.com/technology/archive/2012/03/how-engineering-the-human-body-could-combat-climate-change/253981/>

Bosch, Torie 2012. "Is 'Human Engineering and Climate Change' a Case of Academic Trolling?" <http://www.slate.com/blogs/future_tense/2012/03/14/human_engineering_for_climate_change_and_trolling_.html>.

Churchland, Patricia 2011. *Briantrust*. Princeton, NJ: Princeton University Press.

Hawkes, John 2012. "Can Bioengineers Make Humans More Sustainable?" <http://www.slate.com/articles/health_and_science/science/2012/03/bioengineering_people_to_fight_global_warming_been_there_done_that_.html>.

Liao, Matthew, Sandberg, Anders and Roache, Rebecca 2012. "Human Engineering and Climate Change," *Ethics, Policy, & Environment.*

Molander, Per 1992 "The Prevalence of Free Riding," *Journal of Conflict Resolution* 36: 756-771.